REMARKS

In response to the Office Action dated March 18, 2008, claims 1-28, 33, 35-37, 43, 45, and 46 have been canceled and claims 29, 34, 38-40, 44, and 55 have been amended. Therefore, claims 29-32, 34, 38-42, 44, and 47-63 are now in the case.

Allowable Subject Matter

The Applicants gratefully acknowledge and appreciate the allowance of claims 37-39 and 46.

The Office Action stated that claims 37-39 and 46 were objected to as being dependent on rejected base claims. However, the Office Action noted that these claims would be allowable if rewritten in independent form including all of the limitations of the respective base claims and any intervening claims.

The Applicants note that the **subject matter of allowable claim 37 along with intervening claims 36 and 35 have been incorporated into amended independent claim 29**. Therefore, the Applicants submit that amended independent claim 29 and all of its dependent claims are in condition for immediate allowance.

The Applicants also note that the **subject matter of allowable claim 46 along with intervening claims 45 and 43 have been incorporated into amended independent claim 40**. Therefore, the Applicants submit that amended independent claim 40 and all of its dependent claims are in condition for immediate allowance.

Section 101 Rejections

The Office Action rejected claims 29-39 and 55-63 under 35 U.S.C. § 101 because the claimed invention is directed to non-statutory subject matter.

In particular, for independent claim 29, the Office Action stated that "[T]he claimed steps are not being performed by any form of computer hardware component." The Office Action also stated that the claimed "computer-readable medium" fails to fall within one of

the four statutory categories of invention.

In response, the Applicants have amended claim 29 to recite a computer-readable medium that has stored and encoded thereon functional descriptive material. Further, amended claim 29 recites structural and functional interrelationships between a computing device and a computer-readable medium that permits the computer readable medium's functionality to be realized. This is statutory subject matter.

The MPEPP §2106.01 states that "[D]escriptive material can be characterized as either 'functional descriptive material" or "nonfunctional descriptive material.'" The MPEP §2106.01 states that "'functional descriptive material' consists of data structures and computer programs which impart functionality when employed as a computer component" (MPEP §2106.01). The Applicants have amended claim 29 to recite a computer-readable medium having stored and encoded thereon computer-executable instructions for performing on a computing device an enhanced local search of web sites and intranets by mining user access logs. Thus, the Applicants believe that amended claim 29 recites functional descriptive material that imparts functionality when employed as a computer component.

The MPEP §2106.01 also states that "[W[hen functional descriptive material is recorded on some computer-readable medium, it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized." The Applicants have amended claim 29 to recite functional descriptive material that is stored and encoded on a computer-readable medium. Again, this is statutory subject matter.

Accordingly, the Applicants respectfully submit that amended independent claim 29 is patentable under 35 U.S.C. § 101 based on the amendments to claim 29, and the legal and technical arguments set forth above and below. Moreover, claims 30-32 and 34-39 depend from amended independent claim 29, and thus also contain patentable subject

matter (MPEP § 2143.03). The Applicants, therefore, respectfully request reexamination, reconsideration and withdrawal of the rejection of claims 29-39 under 35 U.S.C. § 101.

For independent claim 55, the Office Action stated that "[T]he claimed steps are not being performed by any form of computer hardware component." The Office Action also stated that the claimed system fails to fall within one of the four statutory categories of invention.

In response, the Applicants have amended claim 55 to recite a general-purpose computing device and a computer program that contains program modules executable on the computing device. The Applicants are not claiming a computer program *per se*, but a system that includes a computer program, but is nevertheless statutory.

Specifically, as stated in the MPEP (see Section 2106 (IV)(B)(1)(a) at Page 2100-13, Rev. 2, May 2004):

> "Computer programs are often recited as part of a claim. Office personnel should determine whether the computer program is being claimed as part of an otherwise statutory manufacture or machine. In such a case, the claim remains statutory irrespective of the fact that a computer program is included in the claim. **The same result occurs when a computer program is used in a computerized process where the computer executes the instructions set forth in the computer program.**"

Accordingly, the Applicants respectfully submit that amended independent claim 55 is patentable under 35 U.S.C. § 101 based on the amendment to claim 55, and the legal and technical arguments set forth above and below. Moreover, claims 56-63 depend from amended independent claim 55, and thus also contain patentable subject matter (MPEP § 2143.03). The Applicant, therefore, respectfully requests reexamination, reconsideration and withdrawal of the rejection of claims 55-63 under 35 U.S.C. § 101.

<u>Section 103(a) Rejections</u>

The Office Action rejected claims 29-32 and 34-63 under 35 U.S.C. § 103(a) as being unpatentable over a paper by Page et al. entitled "The Page Rank Citation Ranking: Bringing Order to the Web - 1998," and in view of a paper by Pei et al. entitled "Mining Access Patterns Efficiently from Web Logs". The Office Action contended that the combination of Page et al. and Pei et al. teaches all the elements of the Applicants' claimed invention.

In response, the Applicants respectfully traverse these rejections. In general, the Applicants submit that the combination of Page et al. and Pei et al. is lacking several claims features. More specifically, neither Page et al. nor Pei et al. disclose, either explicitly or implicitly, the material claimed features of:

1. (recited in amended independent claim 29): "determining a frequency of each of the ordered pairs";
   "defining a minimum support threshold";
   "applying the minimum support threshold to the frequency of each of the ordered pairs";
   "filtering the ordered pairs to remove any ordered pairs that are infrequently occurring";

2. (recited in amended independent claim 40): "defining an adjacency matrix to describe the updated implicit links graph";
   "defining a modified re-ranking formula in terms of the adjacency matrix";
   "modifying the re-ranking formula using a random walk technique"; and

3. (recited in amended independent claim 55): "an ordered pairs generator that <u>extracts implicit links from the user access log</u> and generates ordered pairs of the extracted implicit links".

The combination of Page et al. and Pei et al. also fails to appreciate the advantages of these claimed features. In addition, there is no technical suggestion or motivation disclosed in either Page et al. or Pei et al. to define these claimed features. Thus, the Applicants submit that the combination of Page et al. and Pei et al. cannot make obvious the Applicants' claimed features listed above.

To make a prima facie showing of obviousness, all of the claimed features of an Applicant's invention must be considered, especially when they are missing from the prior art. If a claimed feature is not disclosed in the prior art and has advantages not appreciated by the prior art, then no prima facie showing of obviousness has been made. The Federal Circuit Court has held that it was an error not to distinguish claims over a combination of prior art references where a material limitation in the claimed system and its purpose was not taught therein. *In re Fine,* 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988). Moreover, as stated in the MPEP, if a prior art reference does not disclose, suggest or provide any motivation for at least one claimed feature of an Applicant's invention, then a prima facie case of obviousness has not been established (MPEP § 2142).

Amended Independent Claim 29

Amended independent claim 29 of the Applicant's claimed invention recites a computer-readable medium having stored and encoded thereon computer-executable instructions for performing on a computing device an enhanced local search of web sites and intranets by mining user access logs. The instructions include segmenting the user access log into different browsing sessions, generating ordered pairs of pages from the browsing sessions to find implicit links by using a gliding window to move over explicit paths of the browsing sessions to generate the ordered pairs of pages, determining a frequency of each of the ordered pairs, defining a minimum support threshold, applying the minimum support threshold to the frequency of each of the ordered pairs, and filtering the ordered pairs to remove any ordered pairs that are infrequently occurring. The instructions also include constructing an implicit links graph from the implicit links, generating two-item

sequential patterns from the ordered pairs, updating the implicit links graph using the two-item sequential patterns, re-ranking search results obtained from a search engine to enhance the local searching to produce updated search results, and displaying the updated search results to a user.

As mentioned above, the **subject matter of allowable claim 37 along with intervening claims 36 and 35 have been incorporated into amended independent claim 29**. Therefore, the Applicants submit that amended independent claim 29 and all of its dependent claims are in condition for immediate allowance.

Amended Independent Claim 40

Amended independent claim 40 of the Applicant's claimed invention recites a computer-implemented method contained on computer-readable media having computer-executable instructions for execution on a computing device for enhancing initial search results of a search engine performing a local search of a web sub-space using a user access log. The instructions include pre-processing the user access log, segmenting the log into browsing sessions, generating ordered pairs of implicit links from the browsing sessions, filtering the ordered pairs using a minimum support threshold to remove any infrequently occurring ordered pairs to generate two-item sequential patterns, and updating an implicit links graph using the two-item sequential patterns. The instructions also include defining an adjacency matrix to describe the updated implicit links graph, defining a modified re-ranking formula in terms of the adjacency matrix, and modifying the re-ranking formula using a random walk technique. The instructions further include re-ranking the initial search results using the updated implicit links graph to generate enhanced search results, and displaying the enhanced search results to a user.

As mentioned above, the **subject matter of allowable claim 46 along with intervening claims 45 and 43 have been incorporated into amended independent claim 40**. Therefore, the Applicants submit that amended independent claim 40 and all of its dependent claims are in condition for immediate allowance.

<u>Amended Independent Claim 55</u>

Amended independent claim 55 of the Applicant's claimed invention recites an implicit links search enhancement system for an enhancing initial search results obtained from a search engine by mining a user access log. The system includes a general-purpose computing device, and a computer program comprising program modules executable by the general-purpose computing device. The computer program includes an ordered pairs generator that <u>extracts implicit links from the user access log</u> and generates ordered pairs of the extracted implicit links, an update module that updates an implicit links graph using the ordered pairs, and a re-ranking module that re-ranks the initial search results based on a modified link analysis technique to generates enhanced search results. The system also includes a display device in communication with the general-purpose computing device on which the enhanced search results are displayed.

The Applicants' amended claim 55 recites extracting implicit links from a user access log. The Applicants' claimed invention states that "implicit links are implicit recommendation links" (specification, page 6, line 15). "All probable implicit links then are extracted from the user access log using a two-item sequential pattern mining technique" (specification, page 6, lines 16-17). An "implicit links graph is constructed using the extracted implicit links" (specification, page 6, lines 18-19). The "implicit links graph is used in place of an explicit link graph used in conventional link analysis techniques" (specification, page 19, lines 5-6). More specifically, "[T]he implicit links search enhancement system and method constructs an *implicit link graph instead of the traditional explicit link graph* in a small web sub-space. This implicit links graph is a weighted directed graph $G' = (V, E')$, where V is same as above, *except that E' encompasses the implicit links between pages*. Furthermore, each implicit link $l_{i,j} \in E'$ is associated with a new parameter $P(w_j|w_i)$ denoting the conditional probability of the page w_j to be visited given current page w_i" (specification, page 20, lines 6-12; emphasis added).

The Applicants' specification discusses the problem with using explicit links. In

particular, "for the global Web, existing link analysis uses explicit links to a certain site to determine the ranking of the site. While this recommendation assumption is generally correct for the Web, it is commonly invalid for a Web site or intranet. In general, this is because there are relatively few explicit links and the links are created by a small number of authors whose purpose is to organize the contents into a hierarchical structure. Thus, in general the authority of pages is not captured correctly by link analysis" (specification, page 4, lines 20-26). To address this problem, the Applicants' claimed invention recited in claim 55 <u>extracts implicit links from a user access log</u>.

In contrast, Page et al. merely disclose a global search engine algorithm that extracts explicit links and uses these explicit links to rank a page. Nowhere do Page et al. discuss extracting implicit links from user access logs. Instead, Page et al. use explicit links, which exists in the HTML structure, to calculate a PageRank as an importance of a page. At the bottom of page 3 in Page et al. a simple ranking equation is set forth that includes an N_u term. As stated in Section 2.4 on page 3 of Page et al., the N_u term is "the number of links from u", where u is a web page. In Section 2.2 on page 3 of Page et al., the link structure of the Web is discussed. In that discussion, only backlinks and forward links are discussed. These are explicit links. These explicit links are used in the PageRank calculation.

Pei et al. adds nothing to the cited combination that would render the Applicants' claimed invention obvious. Specifically, Pei et al. merely disclose efficient Web access pattern mining from Web logs. However, nowhere do Pei et al. disclose the Applicants' claimed feature of extracting implicit links from user access logs.

The combination of Page et al. and Pei et al. also fails to appreciate or recognize the advantages of the Applicants' claimed features recited in amended independent claim 55, of extracting implicit links from user access logs. More specifically, extracted implicit links are used to improve the performance and efficiency of local search engines by generating an implicit links graph and replacing an explicit links graph with the implicit links graph (specification, page 4, lines 18-26). Neither Page et al. nor Pei et al. discuss or

appreciate these advantages of these claimed features recited in amended claim 55 of the Applicants' invention.
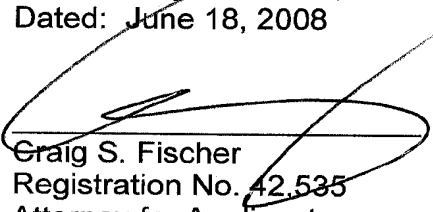
The Applicant, therefore, submits that obviousness cannot be established since the combination of Page et al. and Pei et al. fails to teach, disclose, suggest or provide any motivation for the Applicants' claimed feature recited in amended independent claim 55 of: "an ordered pairs generator that <u>extracts implicit links from the user access log</u> and generates ordered pairs of the extracted implicit links". In addition to explicitly lacking this feature, the combination of Page et al. and Pei et al. fails to implicitly disclose, suggest, or provide motivation for this feature. Further, the combination fails to appreciate advantages of this claimed feature.

<div align="center">Conclusion</div>

In view of the amendments to claims 29, 34, 38-40, 44, and 55 and the arguments set forth above, the Applicants submit that pending claims 29-32, 34, 38-42, 44, and 47-63 are in condition for immediate allowance. The Examiner, therefore, is respectfully requested to withdraw the outstanding rejections of the claims and to pass all of the claims of this application to issue.

In an effort to expedite and further the prosecution of the subject application, the Applicants kindly invite the Examiner to telephone the Applicants' attorney at (805) 278-8855 if the Examiner has any comments, questions or concerns, wishes to discuss any aspect of the prosecution of this application, or desires any degree of clarification of this response.

Respectfully submitted,
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